

Computer Aided River Management System for the Murrumbidgee River

March 2017

The Basin Plan sets a sustainable diversion limit (SDL) for each catchment and aquifer in the Basin, as well as an overall limit for the Basin as a whole. In order to meet the new limits, 2,750 GL of water needs to be recovered Basin-wide. NSW's share of this "SDL gap" is 1,310 GL, with approximately 965 GL¹ of water recovered to date. For the remaining 345 GL of recovery, NSW is pursuing investment by the Commonwealth Government in a range of projects and programs, with infrastructure projects being prioritised over water buybacks.

This document provides an overview of the *Computer Aided River Management system for the Murrumbidgee River* (CARM) supply measure project being proposed by NSW. The proposal also involves operational and management constraint measure benefits by enhancing the ability to deliver environmental flows.

This business case proposes that the investment in the CARM system, which will improve the daily operation of the Murrumbidgee River, and will reduce the current level of operational surplus flows. This, in turn, allows water to be allocated to achieving environmental benefit and released at other times to better achieve these outcomes.

Fast Facts

Location	The Murrumbidgee River
Type of project	Supply measure involving improved monitoring, increased automation and changes to river operation rules which allow more flexibility and control of water delivery, generating operational water savings which can be used for environmental benefit
Status	Business case submitted in October 2015 and is being assessed by the inter-jurisdictional SDL adjustment advisory committee (SDLAAC).
Estimated SDL adjustment	Potentially 10 - 20 GL/year
Related SDL adjustment projects	This proposal is one of the three related SDL-offset initiatives being progressed for the Murrumbidgee River System. The others being the Yanco Creek Regulator and the modernisation of effluent creeks. Any potential inter-dependencies between this supply measure and other measures cannot be formally ascertained at this time, until a final package of proposed supply measures is identified and modelled by the MDBA.

¹ Information sourced from MDBA website. Includes Commonwealth water recoveries contracted through the Sustainable Rural Water Use and Infrastructure Program (SRWUIP) Infrastructure projects, the South Australian River Murray Sustainability Program (SARMSP) and the Water Smart Australia Program. Estimates do not take into account potential changes as a result of the Northern Basin Review, and proposed changes to the long term diversion limit equivalent factors.

Under these conditions, the complexity of river operations often results in excess water being released from Burrinjuck and Blowering dams, which is surplus to the actual water demands in the Murrumbidgee catchment and End of System targets.

The CARM system now provides operators with a much more comprehensive and interpreted set of information. Key elements include:

- Real-time linkages to river and tributary gauging stations, and to telemetered rainfall and evaporation observation stations in the catchment;
- Automated import of Bureau of Meteorology rainfall forecasts for up to seven days into the future, and conversion into boundary conditions for rainfall runoff models;
- Lumped conceptual rainfall runoff models of gauged and ungauged tributaries and much of the river corridor in the upper river;
- A hydrodynamic model of the Murrumbidgee and Tumut rivers, Yanco Colombo Billabong Creek, Old Man Creek, Bundidgerry Creek, and approximately 200 individual wetlands along the river corridor;
- Data assimilation of modelled river levels and tributary runoff to observed conditions prior to forecasting;
- Automated systems for importing water user future demands, as well as current realtime metered usage;
- River corridor surface water – groundwater exchange and evapotranspiration; and
- Forecast and data series archiving.

CARM is making control of water flows and dam releases more precise and efficient through linking the physical upgrades to river infrastructure and accurate measurement/metering with hydrodynamic operational modelling and flow information systems.

Operational improvements are achieved through the integration of real time river monitoring, extraction metering, hydrodynamic river models and optimisation software systems. These improvements in operator tools and optimisation result in less regulated 'operational surplus' water being released from storages to downstream customers. This enables the stored surplus now under the river operator's control, to be retimed to meet desired environmental flow targets.

The water supply measure will result in the creation of an additional entitlement that does not affect the reliability of current users in the valley.

Ecological Outcomes

The proposal increases the amount of water available to meet environmental needs, as well as improving the delivery efficiency of water for the environmental, as well as consumptive users.

Improving delivery to reconnect the river to the lower floodplain, anabranch creeks and lagoons has multiple environmental benefits, including supporting the recovery, growth and reproduction of vegetation communities. The vegetation communities provide habitat and food for native animals, including fish, frogs, turtles, waterbirds and woodland birds. Higher flows also provide cues for animals such as fish to move and reproduce.

Risks and Impacts

A rigorous risk assessment was completed as part of the Business Case development. The table below shows a summary of the risks which had an initial rating of high. Once the mitigation was applied the residual risk was low or moderate. Please refer to the business case for the full risk assessment.

Description of threat	Mitigation
Murrumbidgee valley water users don't support CARM nor recognise the project can produce an approved SDL offset under the MDBA Plan and the Water Act 2007.	Successful implementation of Murrumbidgee CARM computing technology with demonstrated achievements; Implementation of UTS (Institute for Sustainable Futures) MER Framework; Continued reporting to key stakeholders (internal & external) through stakeholder engagement strategy since 2015/16 water year.
Irrigator reliability and current accepted river operating rules are compromised and impacted	Implement recommended changes (conservative assumptions) to the IQQM modelling; External peer review; Ongoing engagement of Water Operations personnel; NOW and external SDL modelling Peer Review of assumptions; CARM system coding of all structure operating requirements fully implemented
The CARM operating system and project design does not deliver demonstrable improved river environmental management outcomes	Murrumbidgee CARM operating system (hydraulic system, data management and modelling requirements) QA system implemented, verified and performance review; Maximise use of scenario planning and forecasting linked to improved catchment measurement and monitoring.

Consultation

WaterNSW has made numerous presentations of CARM to stakeholders over the last five years of project development. Water users and agencies receive a regular update on the project at each quarterly meeting of the Murrumbidgee Customer Service Committee. A broader engagement and communication process with water users has been developed for the next phase of the project which relates to the Evaluation Framework and the creation of the appropriate water account(s).

All organisations materially affected by this proposal have been consulted in the development of this business case. This includes the Murrumbidgee Customer Steering Committee, NSW Irrigators Council and RAMROC (Riverina and Murray Regional Organisation of Councils)

There is a high level of support for the CARM project and its investment in best practice river operations systems. However, support for creation of further water entitlements is subject to the modelling being completed for the package of Murrumbidgee measures that demonstrates no impacts to reliability of allocations for water users, and the results of the evaluation framework following the proposed three-year verification period.

Next steps for adjustment mechanism confirmation

Date	Details
30 June 2017	BOC notification of final approved SDL adjustment package
Late October 2017	MDBA public consultation on proposed SDL adjustment
15 December 2017	MDBA recommend SDL adjustment to Commonwealth Water Minister
February 2018	Amendments tabled in parliament
From March 2018	Commence detailed design, construction and commissioning under Commonwealth funding

More information

Background on the Basin Plan implementation and the SDL adjustment process can be obtained from:

www.mdba.gov.au

DPI Water is the lead agency for the implementation of the Basin Plan agreements within NSW. Reports on NSW SDL adjustment activities reports can be obtained from:

<http://www.water.nsw.gov.au/Water-management/Water-recovery>

Acknowledgements

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